

A reassessment of some Bornean Lonchodinae and Aschiphasmatidae, with some lectotype designations, new synonyms, and the description of two new species

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Abstract

A visit to the natural history museums in Vienna and Dresden, along with photographs kindly sent to me, and some cultured specimens have enabled a reassessment of some of the Bornean species of Lonchodinae. The male of *Lonchodes rusticus* (Brunner, 1907) is described and illustrated. Seven new synonyms have been identified: *Prisomera morbosum* Brunner, 1907 is a junior synonym of *Lonchodes imitator* (Brunner, 1907); *Prisomera indefinitum* Brunner, 1907 is a junior synonym of *Lonchodes rusticus* (Brunner, 1907); *Lonchodes infrequens* Brunner, 1907 is a junior synonym of *Lonchodes jejunus* (Brunner, 1907); *Phenacephorus parahaematomus* Bragg, 1995 is a junior synonym of *Phenacephorus sepilokensis* Bragg, 1994; *Lonchodes hosei herberti* Bragg, 2001 and *Carausius collega* Brunner, 1907 are both junior synonyms of *Lonchodes cultratolobatus* (Brunner, 1907) n.comb.; *Prisomera rubrifemur* Brunner, 1907 is almost certainly a junior synonym of *Lonchodes modestus* (Brunner, 1907). The syntype series of several species described by Brunner (1907) have been found to contain more than one species: lectotypes are designated for six species of Lonchodinae. Two new species are described from Kinabalu National Park, Sabah: *Lonchodes bushelli* n.sp. and *Dinophasma viridis* n.sp. *Presbistus fragilis* Seow-Choen, 2000 is transferred to *Necroscia* Audinet-Serville, 1838 and renamed *Necroscia ischnotegmina* nom.nov. *Xylobistus* Zompro, 2004 is a new synonym of *Dinophasma* Uvarov, 1940.

Key words

Phasmida, Phasmatodea, Borneo, new synonyms, lectotype designations, *Lonchodes bushelli* n.sp., *Dinophasma viridis* n.sp., *Necroscia ischnotegmina* nom.nov., *Xylobistus*.

Introduction

The publication of *Phasmids of Borneo* (Bragg, 2001) cleared up many of the problems surrounding Bornean Lonchodinae. However, a few problems remained because I had not seen all the type material, and the opposite sexes of some species were unknown. A combination of events: visits to two museums, the collection of living material and examination of some photographs, has resulted in this paper which clarifies a number of issues. *Prisomera indefinitum* Brunner, 1907 was omitted from my book because the locality was wrongly recorded in Brunner's (1907) publication.

In May 2001 I visited Dresden Museum (SMTD) and located a pair of *Lonchodes rusticus* (Brunner, 1907) in the collection, prior to this only three females had been recorded, and the male was unknown (Bragg, 2001: 492). This material was taken to Vienna for comparison with type material at NHMW. Confirmation that the male and female had been correctly associated was obtained by examination of material reared by Mark Bushell. As a result a new synonym has been identified.

In 2002 I visited Vienna Museum (NHMW) and examined the type material of the Bornean species housed there. As a result of that visit it became clear that some lectotype designations would be necessary to avoid possible confusion in the future. It is well known that Brunner and Redtenbacher described species from series which have since been shown to comprise more than one species; recently Zompro (2004) described the three new species *Pseudodatames bicornutus*, *Xylobistus braggi*, and *Planispectrum javanense*, all based on material included with other species by Redtenbacher (1906). Examination of the type material of Bornean Lonchodinae in Vienna has shown that in several cases the material of one "species" is actually made up of two or three species mixed together. In each case there is an available name, so no new names are required, but lectotype designations are necessary to ensure stability of the names. There are also species which I had not been able to examine previously because of the reluctance of the museum to post material.

Some photographic evidence has led to two new synonyms being identified. While working on my book I requested the loan of *Carausius cultratolobatus* Brunner, 1907 from

Genova (MCSN) but was unable to borrow the specimen because the museum was in the process of moving to a new building. I have since been able to examine photographs of the specimen and can confirm it is a synonym of a species described in my book. Recently I have received a photograph of a mating pair of *Phenocephorus* which shows two species which I described are in fact male and female of the same species.

While at Kinabalu Park in 2001 I collected new material of Aschiphasmatidae, including *Dinophasma viridis* n.sp. Comparison of this new species and type material of *Xylobistus braggi* Zompro, 2004 shows they belong in the same genus and Xylobistinae is not a valid subfamily. While in Singapore in 2001 I examined the type material of the West Malaysian species *Presbistus fragilis* Seow-Choen, 2000 and found it has placed in the wrong suborder: it belongs in Necrosciinae.

In the following lists the lay-out of the data for Brunner's type specimens is shown as it is on the labels, with italics used to indicate hand-written words. The labels which have just a number are blue and the number refers to the museum's catalogue; all other labels are white. LT refers to lectotype, PLT to paralectotype and HT to holotype; new designations are indicated in bold print. Complete synonymies are not given: only the original name and new synonyms are listed.

Aschiphasmatidae

Dinophasma Uvarov, 1940

Dinophasma Uvarov, 1940: 173 (type species *Phasma guttigera* Westwood, 1859).

Xylobistus Zompro, 2004: 73 (type species *Xylobistus braggi* Zompro, 2004) **new synonym**.

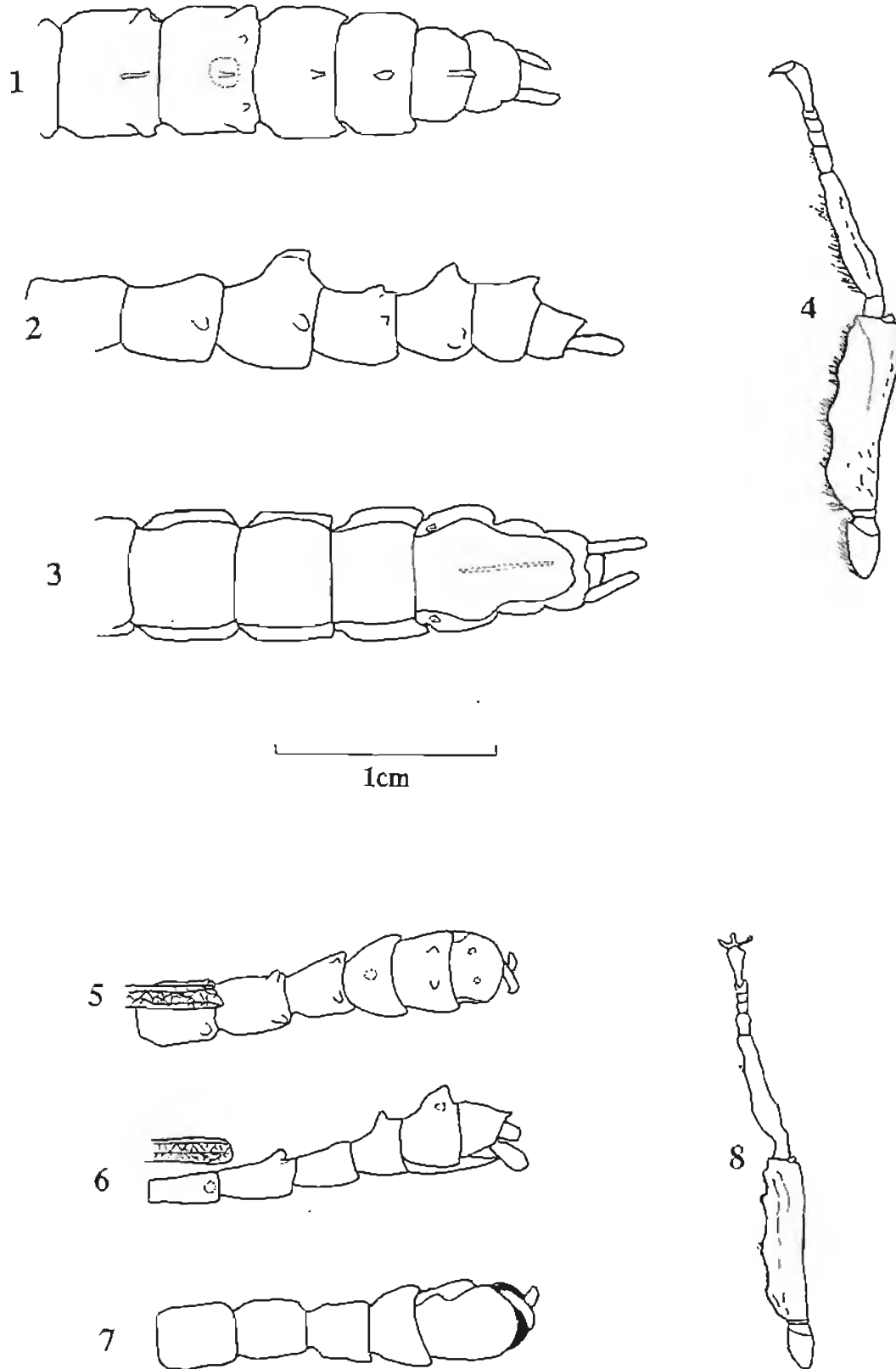
Dinophasma braggi (Zompro, 2004) (figs 1-8)

Xylobistus braggi Zompro, 2004: 73, figs 32a-b (♂), 32c (♀).

The undulating lamina on the femora means *Dinophasma viridis* n.sp. keys out to the genus *Xylobistus* Zompro, 2004 using Zompro's (2004: 71) key to Aschiphasmatidae. However, the lobes on the thorax and abdomen, pectinate ungues, and general body shape clearly place *viridis* in *Dinophasma* Uvarov, 1940; the mesonotal spine of the male is typical of that found in *D. guttigerum* and the mesonotal lobe of the female appears to be just a more swollen version of that found in *guttigerum*.

The tufts of long setae and the undulating lamina on the femora of *viridis*, and the spiniform elytra in the female are similar to those in *Xylobistus braggi* Zompro, 2004, the type species of *Xylobistus*. Examination of the two paratype females of *X. braggi* shows that they do have pectinate ungues, contrary to the description given by Zompro. However, the pectination is extremely fine and can only just be seen under high magnification (50x), and only then if viewed from the correct angle. In contrast, the pectination in *D. viridis* is clearly visible at lower magnification (10x). Abdominal segments 5-9 of the female of *X. braggi* each have an obvious dorsal lobe or swelling and the mesonotum and metanotum each have a slight swelling on the posterior margin; the metanotum has lobes similar to those in *viridis* (fig 15). The male of *X. braggi* has a mesonotal spine and lobes on some abdominal segments (fig 6), it is distinguished from *viridis* because it lacks a triangular lobe on the pronotum.

Xylobistus braggi is therefore transferred to the genus *Dinophasma* and the genus *Xylobistus* Zompro becomes a synonym of *Dinophasma* Uvarov.



Figures 1-8. *Dinophasma braggi*

1-4. Female: dorsal, lateral & ventral views of abdomen and left fore leg.

5-8. Male: dorsal, lateral & ventral views of abdomen and left fore leg.

***Dinophasma mjobergi* Bragg, 2001**

Frank Hennemann kindly gave me a pair of this species which were collected in 2003.

♂ (PEB-3462) SABAH, Crocker range, F.H. Hennemann & O. Conle, 24.iii.2003.

♀ (PEB-3461) SABAH, Crocker range, F.H. Hennemann & O. Conle, 27.iii.2003.

The eggs of this species were previously unknown. I have removed some eggs from the body of the female, one of these is covered in setae so is obviously fully developed. The eggs are much closer to spherical than those of *D. guttigerum* or *saginata* or *kinabaluense*. Length 3.8mm, height 2.8mm, width 2.2mm.

***Dinophasma viridis* n.sp.**

The general appearance and body proportions of this species are similar to the other species of *Dinophasma* which have winged males: *D. guttigerum* (Westwood), *D. saginatum* (Redtenbacher), and *D. ruficornis* (Redtenbacher). When alive this species is easily distinguished from others by the distinctive green and black coloration. Preserved females can be distinguished by the arrangement of dorsal lobes on the body (which are consistent in the two specimens), in particular the mesonotal lobe is constricted at the base and dilated in the middle. Preserved males may be distinguished by the presence of an undulating lamina on the femora, combined with a triangular lobe on the posterior margin of the pronotum.

Material

Holotype: ♀ with eggs (BMNH, PEB-3155) Sabah, Kinabalu N.P. Silau Silau trail. P.E. Bragg, 03.viii.2001.

Paratypes: ♂ (BMNH, PEB-3156) data as holotype; ♂ penultimate instar nymph (PEB-3157) Sabah, Kinabalu N.P. Silau Silau trail. P.E. Bragg, 15.viii.2001; ♀ ([FH-J0346-1) N-Sabah. Mt Kinabalu Park, near Head Quarters, Silau-Silau trail. 1550m. Hennemann & Conle, 04-08.viii.1996.

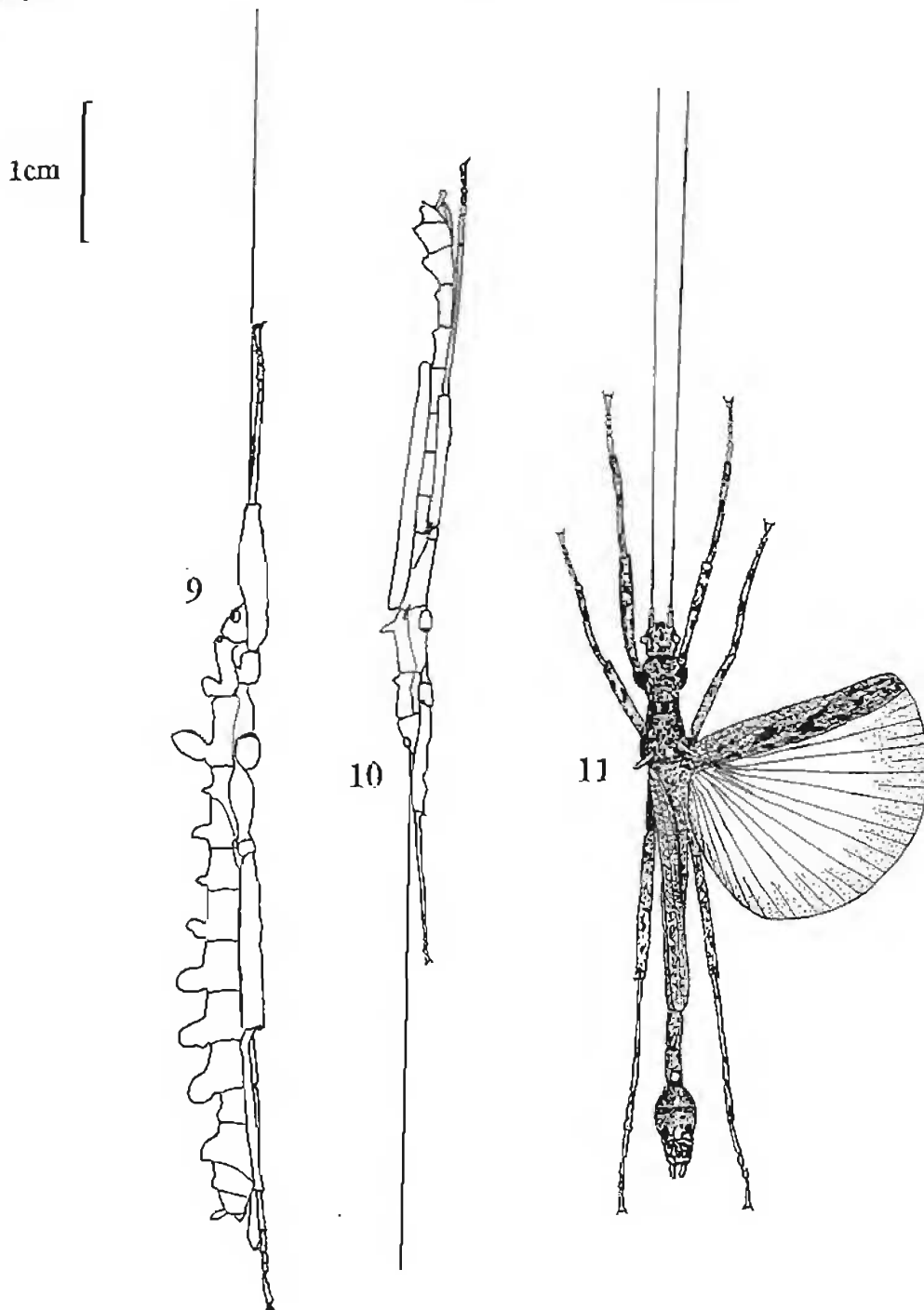
The adult male was found on an adjacent bush within a metre of the holotype female.

Female (figs 9, 12-16)

Holotype with ventral surface of body pale brown, rest of body, and legs and antennae, mottled green and black; green and black present in about even quantities. The holotype has retained the original coloration, although the green has faded slightly. The female paratype was originally preserved in alcohol and has consequently lost its original colouring: it has a uniformly pale brown ventral surface, the rest of the insect is light brown, mottled with dark brown or black. Body very finely setose, with long setae on ventral margins of thoracic pleurites and on lateral margins of abdominal terga. Legs densely setose; all femora, tibiae and coxae with some tufts of very long setae. Body length (including operculum): holotype 47mm, paratype 48mm; full measurements of the holotype are given in table 1.

Head wider than long, posterior hidden by pronotum. Pronotum constricted in the middle, posterior and anterior wider than long, anterior swollen, posterior margin with very obvious lobe. Mesonotum widening towards posterior, posterior margin as wide as length of mesonotum; posterior margin with large lobe shaped like a broad spear-head: a narrow base, a dilated mid section and apex narrowing to a point. Metanotum shorter than median segment; metanotum and abdominal segments 1-9 each with a laterally compressed lobe on posterior margin; lobes increase in size from metanotum to abdominal segment 6 except for segment 2 which is of similar size to metanotal lobe, lobes on 7th and 9th small, 8th large,

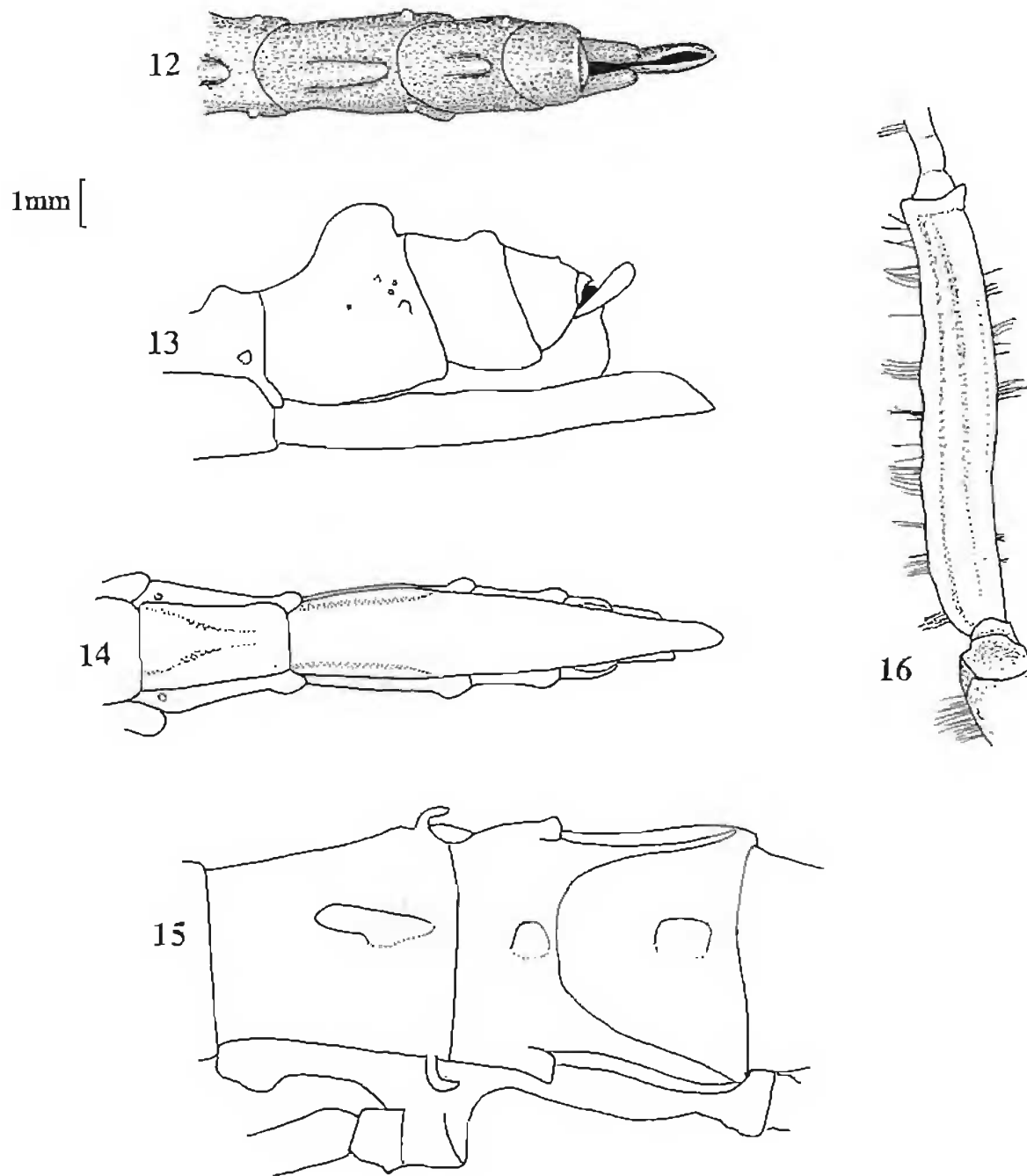
segment 10 without lobe. Apex of 10th segment rounded, lamina supraanalis very small. Cerci projecting beyond the end of the abdomen, straight, cylindrical, apex rounded, base narrowed. Operculum long, slender, apex laterally compressed, almost forming a tube (see fig 12).



Figures 9-11. *Dinophasma viridis* n.sp.

9. Female: lateral view. 10-11. Male: lateral & dorsal views.

Hind legs reaching just beyond apex of abdomen. Fore femur with a slightly undulating lamina on the ventro-posterior carina; similar, but much smaller, undulations are present on the ventro-anterior carinae of the mid and hind legs. Both ventral carinae hind femora and ventro-anterior of mid leg each with two minute spines near the apices; ventro-posterior of



Figures 12-16. *Dinophasma viridis* n.sp., female.

12-14. Apex of abdomen, dorsal, lateral & ventral.

15. Mesonotum and metanotum, dorso-lateral view. 16. Left fore femur.

mid femur and ventro-anterior of fore femora each with one extremely minute spine. Mid and hind tibiae with a ventral undulating lamella. All ungues clearly pectinate. Elytra spine-like, curved. On the metanotum are what may be vestigial hind wings present as small fleshy lobes, about half the length of the elytra (fig 15).

Adult male (Figs 10-11 & 17-20).

Body coloration and setae as in female holotype; wings with costal region similarly mottled in green and black but also with pale brown in place of some of the green, anal region

transparent with margin translucent brown; elytra green with a longitudinal black line. Body length 39mm, full measurements in table 1.

Head about as long as wide. Pronotum slightly longer than wide, posterior margin with small triangular lobe. Mesonotum with spine-like lobe on posterior margin. Metanotum, abdominal segments 1-5 without lobes; segments 6-10 with small lobes on posterior margins (10th very small). Segment 8 widening, 9th narrowing, 10th of uniform width (segments 6-7 appear to have been laterally compressed during preservation). Posterior margin of 10th segment rounded, with a slight indentation at the apex. Cerci project downwards and backwards, slightly curved, almost triangular in cross-section, apices rounded with small spine on the interior surface of the apex. Poculum broad, flat, apex rounded.

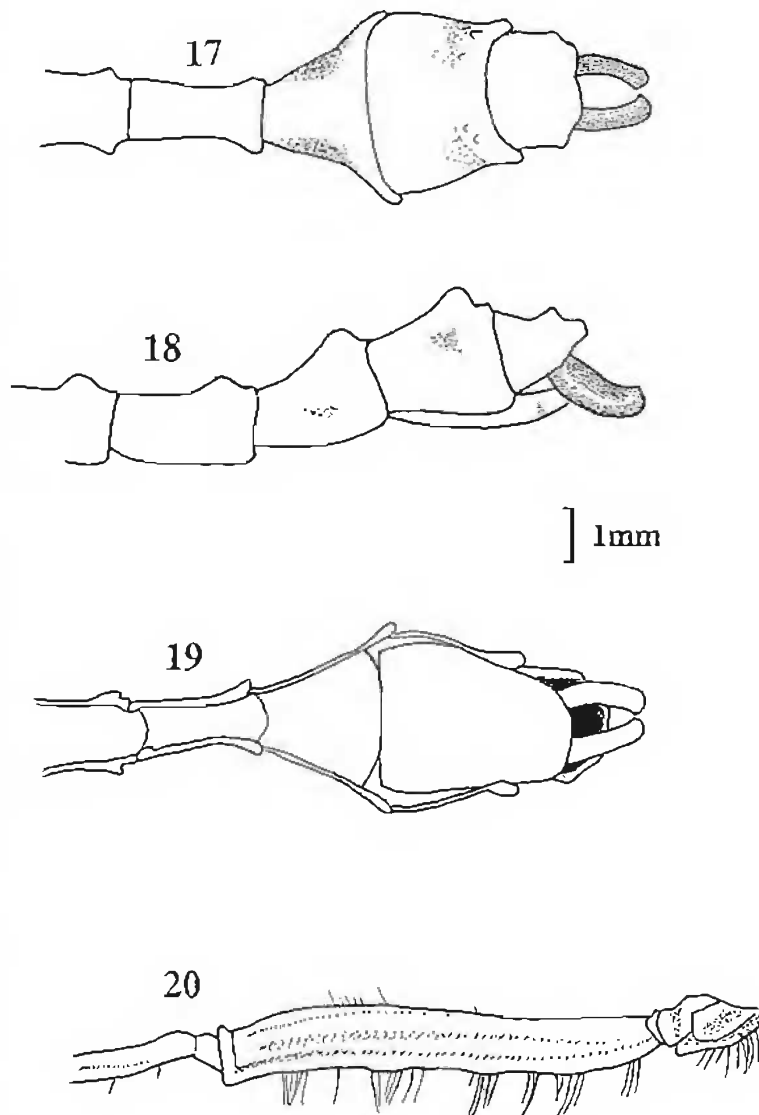
Hind legs reaching just beyond end of abdomen. All femora with lamella as in female; small ventral lamina present on mid and hind tibiae. Fore femur with two extremely minute spines on ventro-anterior carina; mid femur with one extremely minute on ventro-posterior, and 2-3 on ventro-anterior; hind femora with four minute spines on ventro-anterior and two on ventro-posterior carina.

Elytra long, slender, of uniform width, about one third of the length of the mesonotum. Wings reach to just beyond the end of 5th abdominal segment.

Male nymph

Colouration as in adult; the anal region of the wing bud is green with black blotches. The abdomen of the specimen is shrunken and distorted; body length about 34mm, wing buds 4.5mm.

Egg: not known.



Figures 17-20. Male *Dinophasma viridis* n.sp.

17-19. Abdomen of male: dorsal, lateral and ventral.

20. Left fore femur.

Table 1. <i>Dinophasma viridis</i> n.sp. measurements in mm.					
	♀ HT	♂		♀ HT	♂
Total	47	39	Fore femur	9.0	8.0
Antennae	43	38	Fore tibia	7.5	7.0
Head	3.5	2.5	Fore tarsus	6.5	5.0
Pronotum	4.5	3.0	Mid femur	7.5	6.0
Mesonotum	5.0	4.0	Mid tibia	7.5	6.0
Metanotum	2.0	2.0	Mid tarsus	4.5	4.0
Median segment	3.5	3.5	Hind femur	12.0	10.0
Elytron	0.7	1.4	Hind tibia	12.5	11.0
Wing	-	17.5	Hind tarsus	7.5	6.5

Presbistus fragilis Seow-Choen, 2000

This species does not belong in Aschiphasmatidae; see *Necroscia ischnotegmina* **nom.nov.** below (page 29).

Lonchodinae

With the exception of *Carausius cultratorobatus* Brunner, which is transferred to *Lonchodes*, the species below are arranged alphabetically within the genera used in *Phasmids of Borneo*; one previously undescribed species, *Lonchodes bushelli* is included. Although it is recognised that some should probably be placed in other genera, a thorough revision of the suborder would be required to correctly assign all the species.

Carausius abbreviatus (Brunner, 1907)

Dixippus abbreviatus Brunner, 1907: 280.

Data for the NHMW types in Bragg (2001: 419) was taken from Brunner (1907: 281) and is incorrect. Brunner recorded the NHMW specimens as coming from Kina Balu; the correct data is as follows:

LT ♂ Selected here.	Brunei, Borneo Staudinger	Collectio Br.v.W.	det. Br.v.W. <i>Dixippus</i> <i>abbreviatus</i> Br.	23.380
PLT ♂	Brunei, Borneo Staudinger	Collectio Br.v.W.	det. Br.v.W. <i>Dixippus</i> <i>abbreviatus</i> Br.	20.850

Carausius sanguineoligatus (Brunner, 1907)

Dixippus sanguineoligatus Brunner, 1907: 280.

There are three syntypes in NHMW, all male but of two species. One lacks the end of the abdomen, but is selected as the lectotype of *sanguineoligatus* because the other two are both identical to *Carausius chani* (Hausleithner, 1991).

LT ♂ Selected here.	Coll. Br.v.W. Kina Balu, Borneo Staudinger	det. Br.v.W. <i>Dixippus</i> <i>sanguineoligatus</i>	20.843	
PLT ♂	Coll. Br.v.W. Kina Balu, Borneo Staudinger	det. Br.v.W. <i>Dixippus</i> <i>sanguineoligatus</i>	19.589	<i>C. chani</i> (Hausleithner, 1991) det. P.E. Bragg, 2002
PLT ♂	Coll. Br.v.W. Kina Balu, Borneo Staudinger	det. Br.v.W. <i>Dixippus</i> <i>sanguineoligatus</i>	25.632	<i>C. chani</i> (Hausleithner, 1991) det. P.E. Bragg, 27.iii.2002

***Lonchodes bushelli* n.sp.**

Holotype: ♀ (BMNH, PEB-3283) SABAH, Kinabalu N.P., Liwagu Trail (Power station end). P.E. Bragg, 26.viii.2001.

Paratypes: all same locality and collector as holotype: 2♂♂ (PEB-3191 & PEB-3192) 15.viii.2001; 2♂♂ (PEB-3193 & PEB-3194) 17.viii.2001; ♂ (BMNH, PEB-3210), ♀ (PEB-3211), ♀ nymph (PEB-3233), ♂ nymph (PEB-3234), ♀ (PEB-3390) 26.viii.2001.

Female (figs 21, 23-29)

Head, body and legs almost uniformly mid or dark brown. Body rugose, densely granulose, and may or may not have large lobe-like tubercles on the thorax and abdomen. Mid femur, mid tibia and fore tibia with dorsal lobes. Antennae not quite reaching to end of fore tarsi. Body length 56-61mm (Holotype 61mm); full measurements in table 2.

Head rectangular, 1.6 times longer than wide, slightly raised between the eyes. Antennae with basal segment broad, flattened; second segment short, cylindrical; remainder filiform. Pronotum almost rectangular, 1.4 times longer than wide, anterior margin slightly concave, posterior may have a multi-branched lobe. Mesonotum with a longitudinal carina which continues along the metanotum and abdomen as far as half way along the 3rd segment. Mesonotum widening evenly, with a longitudinal carina, with a row of rounded tubercles on the lateral margins and a few scattered randomly; posterior margin may have a bifurcate lobe. Metanotum and median segment of equal width, the junction between the two segments is marked by a lobe or at least a bulge in the longitudinal carina; both segments may have a multi-branched lobe. Meso- and meta-pleura with a row of rounded tubercles. Meso- and metasternum tuberculate. The abdomen widens slightly to the 5th segment, narrowing thereafter. Posterior margin of abdominal segments 2-4 may have small tubercles. 5-9 may have large swollen lobes (figs 22 & 27-29) or small tubercles. Large rounded tubercles are present on the sides of the 6th segment. Segments 2-6 approximately as long as wide and of similar size; 7th wider than long, shorter than 6th; 8th-10th of decreasing length. Lamina supraanalis wider than long. Segments 10 and 11 with a longitudinal carina. Postero-lateral margins of anal segment serrated (fig 23). Abdominal sternites tuberculate. Seventh sternite with a distinct praeopercular organ (fig 25). Operculum rugose and tuberculate, apex slightly pointed.

All legs with corresponding femur and tibia of equal length. Hind tibiae just reaching end of abdomen. Fore and mid femora rugose. Fore femur compressed and curved at the base; with a small triangular lobe near the apex of the ventro-posterior carina, dorso-anterior carina with an undulating lamina, medio-ventral carina very distinct, dorso-posterior only visible at anterior. Fore tibia with dorso-posterior and dorso-ventral carinae fused, except at anterior end, and forming an undulating lamina; medio-ventral carina forming a low-lying

lamina. Mid femur with a triangular lobe and one or two small teeth near the apex of the ventro-posterior and ventro-anterior carinae; dorso-posterior carina with a large lobe near the apex, dorso-anterior with a small lobe near the base (the dorso-posterior carina is not distinguishable on basal third of mid femur). Mid tibia with the two dorsal carinae fused on the basal third and forming a lobe; dorsal carinae distinct on rest of tibia, dorso-anterior with a small lobe near the apex. Hind femur laterally compressed, ventro-posterior with a triangular lobe at the apex, ventro-anterior with a smaller, flatter lobe. Tarsi all with first tarsomere less than the combined length of 2nd and 3rd.

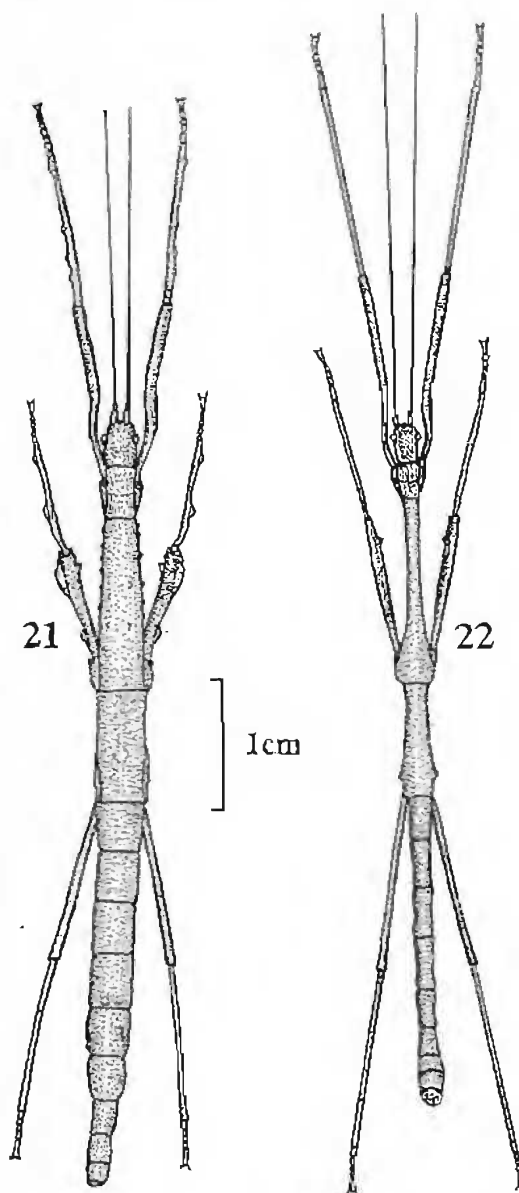
Holotype with lobes or tubercles on posterior of pronotum, mesonotum, metanotum, and abdominal segments 1-8: these are particularly large on pronotum and abdominal segments 5-8 (see fig 29). Lobes are clearly present on the tibiae and body of the female nymph (body length 42mm).

Male (figs 22 & 30-33)

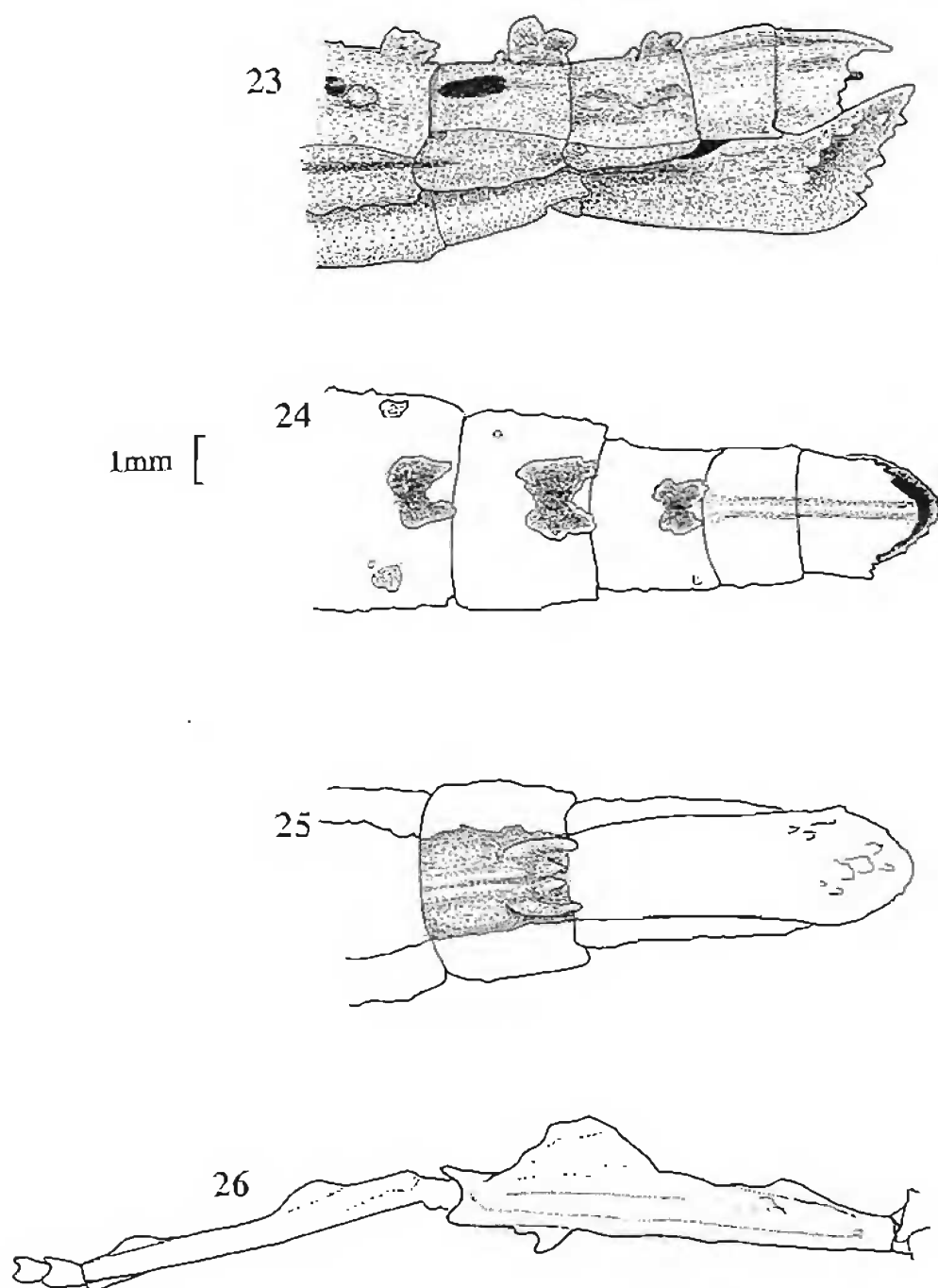
Body very dark green, legs reddish, eyes pale cream, antennae greenish-brown. Head, body and legs very densely granulose. Body of almost uniform width except for pleura projecting at leg joints. Antennae reaching the end of the fore tarsi. Body length 50-52mm; table 2 gives full measurements for a 52mm specimen.

Head rectangular, 1.5 times longer than wide, slightly raised between the eyes but without spines. Pronotum of similar width to head, 1.3 times longer than wide, anterior half raised in the middle, posterior margin curved. Mesonotum 8 times longer than wide, very slightly dilated at posterior; with some swollen granules causing a slightly tuberculate appearance. Metanotum and median segment only distinguishable with difficulty, median segment half as long as metanotum; posterior half of metanotum and median segment 15-20% wider than anterior half of metanotum. Abdominal segments 2-6 of similar length and width, slightly more than twice as long as wide, width equal to anterior half of metanotum; 7th only two thirds the length of 6th and widening, length about equal to width of posterior margin; 8th and 9th of equal length, both wider than long, 9th narrowing slightly; 10th triangular, longer than wide, divided longitudinally. Cerci not visible dorsally, flattened. Poculum short, deep, setose.

All legs with corresponding femur and tibia of equal length. Hind tibiae reaching well beyond end of abdomen. Fore femur compressed and curved at the base; with a small



Figures 21-22. *Lonchodes bushelli* n.sp.
21. Female. 22. Male.

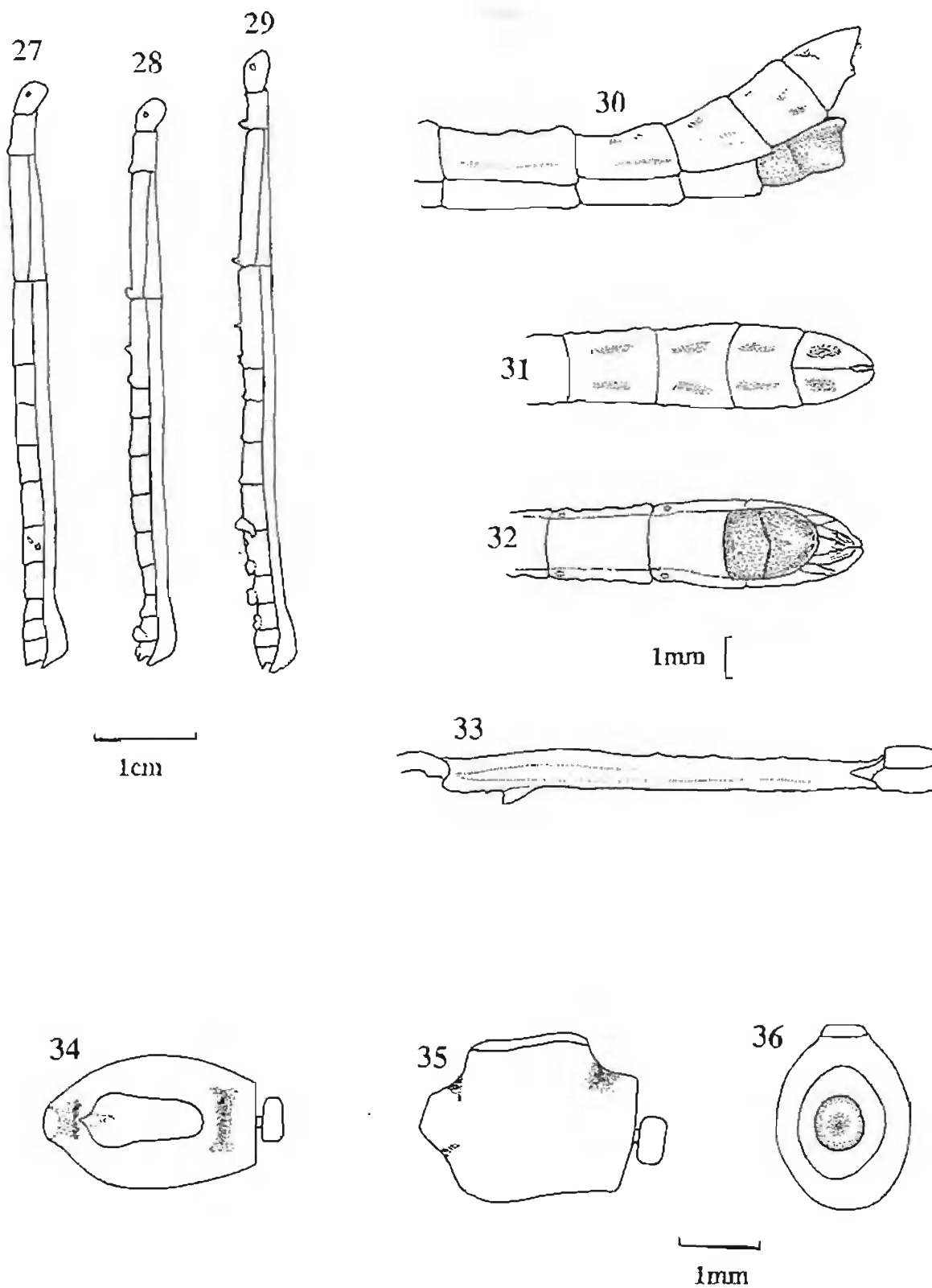


Figures 23-26. *Lonchodes bushelli* n.sp. Female.

23-25. Apex of abdomen: lateral, dorsal and ventral views.

26. Mid femur and tibia.

triangular lobe near the apex of the ventro-posterior carina, ventro-medial carina distinct, dorso-posterior becoming indistinct near the base. Ventro-posterior and ventro-anterior carinae of mid femur each with a triangular lobe and a small tooth near the apex; dorso-posterior carina with a low-lying lobe near the apex. Carinae of fore femur and all tibiae setose, mid and hind femora with very few setae. Dorsal carinae of fore tibiae fused except at apex, ventro-medial very distinct. Fore tarsi with first tarsomere slightly longer than combined length of 2nd and 3rd, mid and hind with basal tarsomere slightly shorter than combined length of 2nd and 3rd.



Figures 27-36. *Lonchodes bushelli* n.sp.

27-29. Females: lateral views.

30-33. Male: abdomen and mid femur.

34-36. Egg: dorsal, lateral, and opercular views.

Egg (figs 34-36)

Capsule and operculum pale brown, micropylar plate pale cream, capitulum yellowish cream. Capsule ovoid with a large micropylar mound and polar mound. Capsule and operculum rugulose, covered in a fine network of raised ridges. Capsule without an opercular collar. Length 2.8mm (3.1mm including capitulum), height 2.0mm, width 1.6mm.

The egg is very similar to *Lonchodes rusticus* (Brunner).

Comments

This species seems to be relatively common on the upper part of the Liwagu trail at Mt Kinabalu Park. It has not been found in the area close to the park head quarters despite considerable collecting by C.L. Chan over many years, and about 15 nights collecting by myself in four visits over a 10 year period. In captivity in the UK it fed on bramble and I reared one female nymph to adult in 2001. Mark Bushell collected more specimens in 2003 and reared them in the UK; unfortunately a sustainable culture was not established.

Table 2. Measurements of <i>Lonchodes</i> (mm)			
	<i>rusticus</i> ♂	<i>bushelli</i> ♀	<i>bushelli</i> ♂
Body length	72	61	52
Antennae	34	24	31
Head	3.5	4	3
Pronotum	3	3.5	2.5
Mesonotum	18	14	13
Metanotum	7	5	6
Median segment	7	4.5	3
Fore femora	17	12	13.5
Fore tibiae	17	12	14
Fore tarsi	5	4	4
Mid femora	13	9.5	9.5
Mid tibiae	10	8	9.5
Mid tarsi	4	3.5	3.5
Hind femora	15	12.5	12.5
Hind tibiae	15	11.5	13
Hind tarsi	4	4	4

***Lonchodes cultratolobatus* (Brunner, 1907) n.comb.**

Carausius cultrato-lobatus Brunner, 1907: 273.

Lonchodes hosei herberti Bragg, 2001: 462, figs 178, 179a-c, 180a-b & pl. 1E. new synonym.

Carausius collega Brunner, 1907: 273. new synonym.

Having examined two photographs of the holotype of *cultratolobatus* there is no doubt that it is the same species as *Lonchodes hosei herberti*. The type material of *Carausius collega* has been destroyed but Brunner (1907: 125) described it as "slightly different" from *C. cultratolobatus*; since the latter species is very variable it is very likely to be a synonym.

***Lonchodes imitator* (Brunner, 1907)**

Dixippus imitator Brunner, 1907: 279, pl.12.7a.

Prisomera hosei Brunner, 1907: 286 [not *hosei* Kirby, 1896] new synonym.

Prisomera morbosum Brunner, 1907: 290, new synonym.

The syntype series of *imitator* comprises three species. All three females are *Carausius chani* (Hausleithner) as previously recorded for one I had previously examined (Bragg, 2001: 422). Two of the males are not the same species as the lectotype (designated in Bragg, 2001: 240), they appear to be *Lonchodes jejunos* (Brunner, 1907). Data labels for the males only are given below.

LT ♂	Coll. Br.v.W. Kina Balu, Borneo Staudinger	Det. Br.v.W. <i>Dixippus</i> <i>imitator</i> Br.	20.564
PLT ♂	coll. Br.v.w. Borneo Fritvaldski	det. Br.v.W. <i>Dixippus</i> <i>imitator</i> Br.	11.024
PLT ♂	Coll. Br.v.W. Borneo Boucard ded.	det. Br.v.W. <i>Dixippus</i> <i>imitator</i> Br.	10.039

The holotype of *Prisomera morbosum* Brunner, which I had not previously examined, was tentatively synonymised with *Lonchodes hosei* (Kirby, 1896) by Günther (1932: 376). The specimen is a male nymph, which is clearly not a synonym of *L. hosei* (Kirby) but probably of *Lonchodes imitator* (Brunner, 1907). Borneo is misspelt Boneo on the data label.

HT ♂ nymph	Coll. Br.v.W. Kina Balu, Boneo Staudinger	det. Br.v.W. <i>Prisomera</i> <i>morbosum</i>	20.841
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I have examined the four NHMW specimens identified as *Prisomera hosei* by Brunner (1907: 286). There are two adult females and two nymphs. I have not checked the identity of the nymphs but the adults are clearly not *Lonchodes hosei* (Kirby, 1896) but are females of the lectotype of *imitator* Brunner. Brunner's misidentification of *hosei* helps to explain why the culture PSG 29, *Lonchodes imitator* (Brunner), was originally identified by Hausleithner (1984), using the NHMW collection, as *Lonchodes hosei*.

***Lonchodes jejunos* (Brunner, 1907)**

Dixippus jejunos Brunner, 1907: 278.

Lonchodes infrequens Brunner, 1907: 261 new synonym.

Dixippus imitator Brunner [PLT ♂♂ only, not LT and not PLT ♀♀] new synonym.

LT ♀ Selected here.	Coll. Br.v.W.	det. Br.v.W.	LECTOTYPE
	Borneo <i>Frivaldski</i>	<i>Dixippus</i> <i>jejunus</i> Br.	det. P.E. Bragg, 27.iii.2002

The lectotype has had eggs removed from the abdomen, presumably by Hausleithner (described in Hausleithner, 1989: 102, figs 2e-f) but there is no label on the specimen to indicate this.

I have only briefly checked the identity of the other Bornean paralectotypes: all appear to be the same species, although some of the males are rather dirty which makes determination difficult. In addition to the Bornean material, there is a female from Sumatra. This specimen appears to be *Lonchodes brevipes* Gray, 1835: it is clearly not the same species as the lectotype.

PLT ♀	W.-Sumatra Fruhstorfer	Collectio Br.v.W.	det.Br.v.W. <i>Dixippus</i> <i>jejunus</i> Br.	25.339	<i>L. brevipes</i> Gray, 1835 det. P.E. Bragg, 27.iii.2002
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Lonchodes infrequens Brunner, 1907 presents a number of problems. There are two males in the NHMW collection labelled by Brunner as *infrequens*. Neither agree exactly with the measurements given by Brunner. One has a telescoped abdomen and an apparent length 84mm, this is probably Brunner's 82mm male. Brunner recorded a length of 110mm for a female, but the female was not described and there is no female in the collection; the second male is 101mm. It seems likely that the record of female 110mm is a typographic or transcription error for the 101mm male. Both males are identical to *L. jejunus* (Brunner, 1907). The 101mm specimen is selected as the lectotype because it is in better condition. The blue label on the lectotype should probably read 13.833. The data for *infrequens* is as follows:

LT ♂ Selected here.	coll. Br.v.W. Borneo Grabowski	det. Br.v.W. <i>Lonchodes</i> <i>infrequens</i> Br.	13833
PLT ♂	coll. Br.v.W. Borneo	det. Br.v.W. <i>Lonchodes</i> <i>infrequens</i> Br.	22.771

Lonchodes modestus (Brunner, 1907)

Prisomera modestum Brunner, 1907: 268.

Prisomera rubrifemur Brunner, 291 new synonym?

The two types of *modestus* are very clearly different species, it is difficult to believe that Brunner associated these two specimens! One belongs with the adjacent species in the cabinet drawer, it is possible that the specimen strayed across the dividing line and was then mislabeled.

The lectotype has had eggs removed from the abdomen, presumably by Hausleithner

(described in Hausleithner, 1989: 102. fig 3g) but there is no label on the specimen to indicate this. The mid legs of the lectotype agree with my illustrations (Bragg, 2001: figs 194d & 194g). The paralectotype has also had the abdomen cut open.

LT ♀ Selected here.	S. Borneo Fruhstorfer	Collectio Br.v.W.	det. Br.v.W. <i>Prisomera</i> <i>modestum</i>	22.448
PLT ♀	Coll. Br.v.W. Kina Balu, Borneo Staudinger	det. Br.v.W. <i>Prisomera</i> <i>modestum</i>	20.565	

Prisomera rubrifemur Brunner is almost certainly the male of *modestus*; however, when I visited NHMW I did not have any male specimens of *modestus* with me to make a direct comparison.

***Lonchodes rusticus* (Brunner, 1907)**

Prisomera rusticum Brunner, 1907: 288, pl. 13.2 (♀).

Prisomera indefinitum Brunner, 1907: 290, pl. 13.3 (♂) **new synonym.**

Prisomera indefinitum was omitted from *Phasmids of Borneo* because Brunner (1907: 290-291) states "Ins. key." as the locality. The correct data is as follows:

HT ♂	Coll. Br.v.W. Kina Balu, Borneo Staudinger	det. Br.v.W. <i>Prisomera</i> <i>indefinitum</i>	20.840
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This new synonym is based on a direct comparison of the holotypes of *indefinitum* and *rusticus* in NHMW with a pair of *rusticus* which I had borrowed from Dresden museum; the latter were later compared with captive bred material.

Previously unrecorded material:

♀ (SMTD) NORD-BORNEO. Waterstradt.

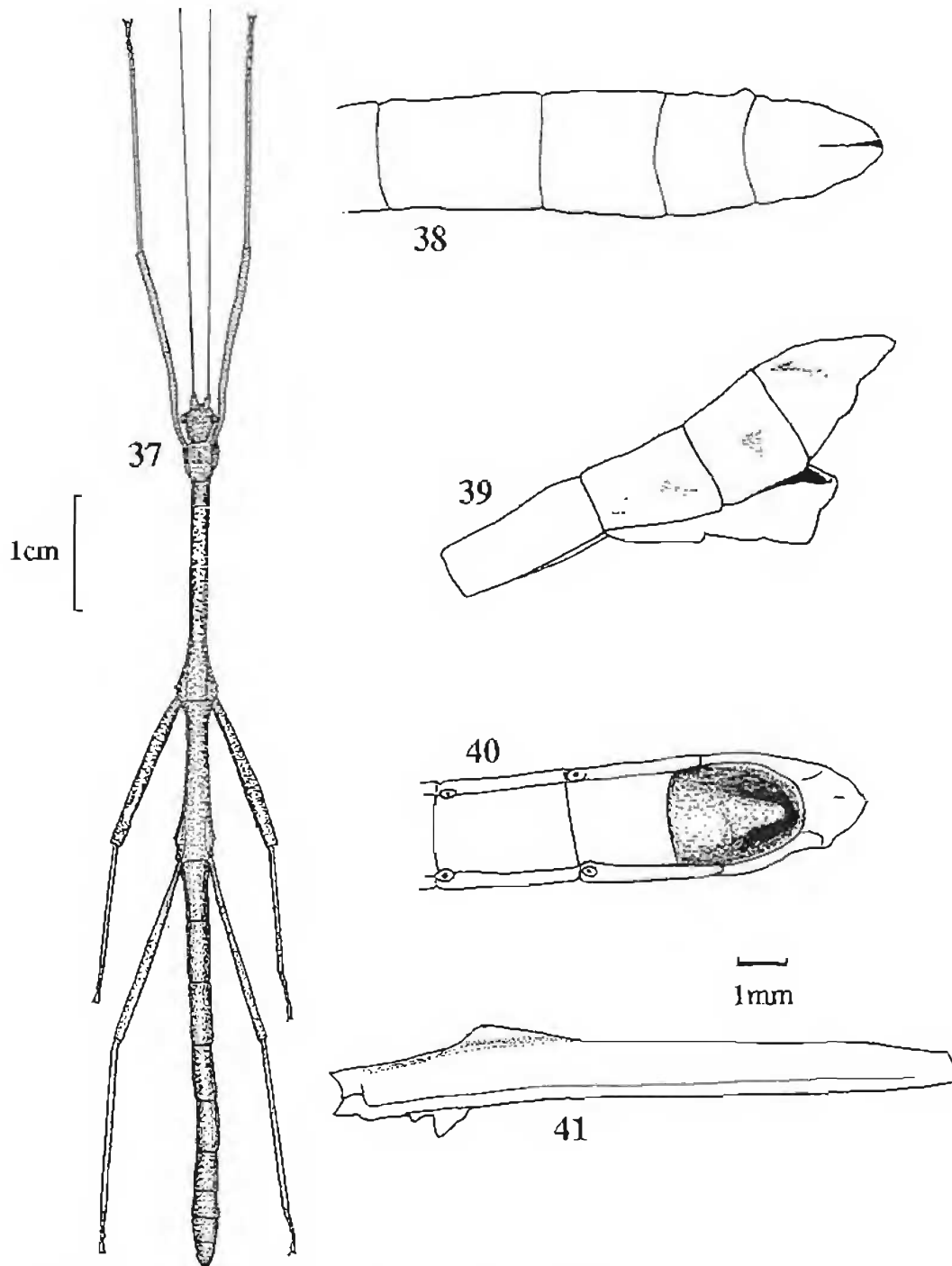
♂ (SMTD) BRUNEI.

2♀♀ (PEB-3333 & PEB-3334), 2♂♂ (PEB-3335 & PEB-3336) SABAH, Kinabalu Park, Silau Silau Trail. Captive reared by Mark Bushell in 2003 from stock collected 24.viii.2001.

Both SMTD specimens bear a small label which reads "1934 6", and both have determination labels by K. Günther, the male's: "*Lonchodes rusticus* Br.", the female's: "*Lonchodes hosei* Kby. *P. rusticus* Redt."

Description of the male (figs 37-41)

Whole insect mid-brown to reddish-dark brown, legs darker than body; densely granulose and slightly rugulose; abdomen and femora more rugulose than thorax; thorax with a few very small black tubercles; carinae of legs setose. Body length 67-72mm. full measurements in table 2.



Figures 37-41. *Lonchodes rusticus* (Brunner), Male.

37. Dorsal view. 38-40. Abdomen, dorsal, lateral and ventral views. 41. Mid femur.

Head 1.4 times longer than widest point, narrowing at the rear, with a bispinose ridge between the eyes, and with four tubercles at the posterior of the head. Antennae with basal segment flattened and widened, second segment shorter and cylindrical, remainder slender and rather indistinctly segmented.

Pronotum rectangular, as wide as rear of head, 1.5 times longer than wide. Mesonotum of almost uniform width: only slightly wider at anterior and posterior. Metanotum wider than mesonotum. Mesonotum and metanotum slightly tuberculate. Metanotum and median segment gradually widening, joint between these segments distinguishable only with difficulty.

combined length about six times the width at mid point. Pro-, meso-, and metapleura dilated where the legs join the body. Thoracic sternites densely granulose. Abdomen of uniform width except segments 8 & 9 which are very slightly wider. Abdominal tergites and sternites becoming increasingly rugulose. Abdominal segments 2-6 of equal length, slightly more than twice as long as wide; 7th shorter, only 1.5 times longer than wide; 8th and 9th short, wider than long, 8th widening towards the posterior, 9th narrowing; 10th longer than 9th, triangular, indistinctly divided along its length. Poculum short, rugose and setose. Cerci flattened, well hidden under the abdomen.

Fore and hind legs with tibia and corresponding femur of equal length, mid leg with tibia shorter than femur. Hind legs reaching only slightly beyond the apex of the abdomen. Fore femur compressed and curved at the base; with a triangular lobe near the apex of the ventro-posterior carina, a small tooth may also be present. Mid femur swollen, dorso-posterior carina with a lobe near the apex (fig 41); ventro-posterior and ventro-anterior each with a triangular lobe and 2-3 minute teeth near the apex. Hind femur laterally compressed, with two small teeth near the apex of the two ventral carinae. Tarsomeres 1-4 of decreasing length, first tarsomere about one third of the tarsal length.

Comments

My specimens of both sexes reared from Kinabalu Park are smaller (♂ 67mm, ♀ 74 & 76mm) than the SMTD specimens (♂ 72mm, ♀ 83mm); Brunner gives 69mm as the length of *indefinitum*. The SMTD female is comparable with C.L. Chan's specimens (83 & 84mm) from Moyog (Bragg, 2001: 492). Measurements in table 2 are for the SMTD specimen.

Phenacephorus auriculatus (Brunner, 1907)

Prisomera auriculatum Brunner, 1907: 289.

The two syntypes are different species and belong in different genera. The female is selected as the lectotype. The male belongs in *Carausius cristatus* Brunner, 1907; it has most of its legs damaged and some missing.

LT ♀ Selected here.	Brunei, Borneo Staudinger	Collectio Br.v.W.	det. Br.v.W. <i>Prisomera auriculatum</i>	18.933
	PLT ♂	Coll. Br.v.W. Labuan, Borneo Schlister	det. Br.v.W. <i>Prisomera auriculatum</i>	19.258

Phenacephorus sepilokensis Bragg, 1994

Phenacephorus sepilokensis Bragg, 1994: 235. figs 1, 6, 7, 10 & 20.

Phenacephorus parahaematomus Bragg, 1995: 204. figs 4-5. new synonym.

C.L. Chan of Kota Kinabalu, Sabah recently showed me a photograph of a mating pair of phasmids taken at Sepilok by Julien Panchout, a French student studying orchids. The photograph is of excellent quality and clearly shows that *parahaematomus* is the male of *sepilokensis*.

Necrosciinae

Necroscia ischnotegmina nom.nov.

Presbistus fragilis Seow-Choen, 2000: 43, plate 118a-b (♂).

The illustrations of this species (Seow-Choen, 2000: plate 118a-b) show an insect with body proportions unlike any member of the Aschiphasmataidae. I therefore examined the paratype material in Francis Seow-Choen's collection during a visit to Singapore in 2001; the tibiae do not have an area apicalis, and the unguis are not pectinate. The species cannot belong in the Aschiphasmataidae since it clearly belongs to the Anareolatae, it is a member of the Necrosciinae and at present is best placed in the genus *Necroscia* Audinet-Serville, 1838.

The name *Necroscia fragilis* (Seow-Choen, 2000) is a secondary homonym of *N. fragilis* (Redtenbacher, 1908) and therefore requires a replacement name. I rename this species *Necroscia ischnotegmina* nom.nov. in recognition of the slender fore wings.

Summary

The males and females of the majority of Bornean Lonchodinae are now known. Both sexes and eggs are known for all species of *Carausius*, *Phenacephorus*, and *Stheneboea* (listed as *Prisomera* in Bragg, 2001). Two *Lonchodes* are still only known from the female: *dajak* (Günther) and *sigillatus* (Brunner). Two are only known from the males, although both are possible synonyms: *L. haematopus* (Westwood) is almost certainly a junior synonym of *amaurops* (Westwood) (Bragg, 2001: 447, 455), *L. sodalis* (Kirby) is a possible senior synonym of *L. harmani* Bragg & Chan (Bragg, 2001: 460, 495). The holotype of *Prisomera rubrifemur* Brunner requires checking with known male of *L. modestus* (Brunner) to confirm the synonym.

Almost all the Bornean species of Lonchodinae have been reared in captivity, although, as in the case of *Lonchodes bushelli*, a successful culture may not always be established. The Aschiphasmataidae are rarely maintained in captivity; only three Bornean species, all in the genus *Dinophasma*, have been reared.

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